

REMARKS

REJECTION UNDER 35 U.S.C. §102

Claims 2, 3, 7, 11, 13, 14, 18 and 23 are rejected under 35 U.S.C. §102(b) as being anticipated by Tepman et al. (USPN 5,879,575; hereafter "Tepman").

It is respectfully submitted that Tepman teaches a method and apparatus for self-cleaning of plasma processing processors wherein the plasma processing and cleaning processes are carried out simultaneously, wherein a portion of the plasma at a section of the inner surface of the reactor vessel is directed at a section that has an area that is smaller than the area of the inner surface of the reactor vessel and that has a time-varying spatial position on the inner surface of the reactor vessel is utilized to clean the reactor vessel.

Independent claims 2 and 26 have been amended to include the controller of claim 10, wherein the controller controls a relative moving speed between the coil antenna and the reaction tube to provide a uniformly distributed capacitive coupling between the coil antenna and the reaction tube and thus reduce a depositing rate of etching products to extend a cleaning interval for cleaning inner walls of the reaction tube.

Claims 10 and 23 have been cancelled without prejudice or disclaimer.

It is respectfully submitted that since Tepman does not teach or suggest utilizing a controller connected to the drive mechanism to control a relative moving speed between the high frequency coil antenna and the reaction tube wherein a uniformly distributed capacitive coupling between the high frequency coil antenna and the reaction tube reduces a depositing rate of etching products to extend a cleaning interval for cleaning inner walls of the reaction tube, amended independent claim 2 of the present invention are not anticipated under 35 U.S.C. §102(b) and are thus not anticipated by Tepman et al. (USPN 5,879,575).

Since claims 3 and 7 depend from amended independent claim 2, claims 3 and 7 are submitted to be allowable under 35 U.S.C. §102(b) over Tepman for at least the reasons that amended independent claim 2 is submitted to be allowable over same.

Amended claim 11 recites the antenna having a portion that is formed by twisting a plate having a uniform thickness and a uniform width by 90 degrees (see specification, page 16, lines 26-30).

In contrast, Tepman shows a coil unit including coils 152, 154 and a coil support 270. Each coil 152, 154 has a circular cross-section. Each branch of the coil support 270 has a rectangular cross-section. Therefore, Tepman does not disclose or suggest an antenna having a portion that is formed by twisting a plate having a uniform thickness and a uniform width by 90

degrees.

Amended claim 13 recites the first winding portion as extending only partially around the outer circumference of the reaction tube at a first location along the axis of the reaction tube. Amended claim 13 additionally recites the second winding portion as extending only partially around the outer circumference of the reaction tube at a second location along the axis of the reaction tube. Amended claim 13 also recites a connection winding portion that electrically connects the first and second portions to one another in series. As further recited in claim 13, the connection winding portion produces a relatively large capacitive coupling with the reaction tube.

In contrast, Tepman does not disclose or suggest the structural arrangement recited in amended claim 13. Tepman actually teaches away from the claimed invention. As may be seen from the drawing figures in Tepman, Tepman teaches coils 152, 154 that extend completely around the circumference of a reaction chamber, which is contrary to the recitations in claim 13, which recite first and second winding portions as extending only partially around the outer circumference of a reaction tube.

Since claims 14 and 18 depend from amended independent claim 13, claims 14 and 18 are submitted to be allowable under 35 U.S.C. §102(b) over Tepman for at least the reasons that amended independent claim 13 is submitted to be allowable over same.

It is respectfully submitted that claims 2 and 13 do not recite the limitation "when performing plasma etching." Thus, claims 2 and 13 are submitted to be in allowable form.

Thus, it is respectfully submitted that claims 2, 3, 7, 11, 13, 14, and 18 are allowable under 35 U.S.C. §102(b) and are not anticipated by Tepman.

REJECTION UNDER 35 U.S.C. §103

A. Claims 10 and 17 are rejected under 35 U.S.C. §103(a) as being unpatentable over Tepman et al. (USPN 5,879,575; hereafter "Tepman") in view of Okumura et al. (USPN 5,888,413; hereafter "Okumura").

Claim 10 has been cancelled without prejudice or disclaimer. Thus, the rejection of claim 10 is submitted to be moot.

Amended claim 13 recites a first winding portion that extends only partially around the outer circumference of the reaction tube at a first location along the axis of the reaction tube, a second winding portion that extends only partially around the outer circumference of the reaction tube at a second location along the axis of the reaction tube, wherein a connection winding

portion electrically connects the first and second portions to one another in series and produces a relatively large capacitive coupling with the reaction tube. Hence, amended claim 13 is submitted to be non-obvious under 35 U.S.C. §103(a) in view of Tepman et al. (USPN 5,879,575) and further in view of Okumura et al. (USPN 5,888,413).

In contrast, Tepman teaches coils 152, 154 that extend completely around the circumference of a reaction chamber, which teaches away from the claimed invention.

Okumura teaches a specialized controller that controls the stepping motor and the plasma processing based on control parameters stored in a memory 101. It is respectfully submitted that Okumura fails to teach a first winding portion that extends only partially around the outer circumference of the reaction tube at a first location along the axis of the reaction tube, a second winding portion that extends only partially around the outer circumference of the reaction tube at a second location along the axis of the reaction tube, wherein a connection winding portion electrically connects the first and second portions to one another in series and produces a relatively large capacitive coupling with the reaction tube, as is recited in amended claim 13.

It is respectfully submitted that there is no teaching or suggestion of combining Tepman and Okumura, and even if said references were combined, they would not teach or suggest the present invention. It is respectfully submitted that the courts have held that the Examiner may not suggest modifying references using the present invention as a template absent a suggestion of the desirability of the modification in the prior art. *In re Fitch*, 23 U.S.P.Q.2d 1780, Fed Cir. 1992. Something in the prior art as a whole must suggest the desirability, and thus, the obviousness, of making the combination. *Alco Standard Corp. v. Tennessee Valley Authority*, 808 F. 2d 1490, 1 U.S.P.Q. 2d 1337 (Fed. Cir. 1986). When a rejection depends on a combination of prior art references, there must be some teaching, suggestion or motivation to combine the references. *In re Geiger*, 815 F.2d 686, 688 2 U.S.P.Q.2d 1276, 1278 (Fed. Cir. 1987).

Thus, since there is no teaching or suggestion of combining the Tepman reference with the Okumura reference, it is respectfully submitted that claims 13 and 17 are patentable under 35 U.S.C. §103(a) over Tepman in view of Okumura.

In addition, since claim 17 depends from amended independent claim 13, claim 17 is submitted to be non-obvious under 35 U.S.C. §103(a) in view of Tepman et al. (USPN 5,879,575) and further in view of Okumura et al. (USPN 5,888,413) for at least the reasons that amended claim 13 is submitted to be non-obvious over same.

B. Claims 21 and 22 are rejected under 35 U.S.C. §103(a) as being unpatentable over Tepman et al. (USPN 5,879,575; hereafter "Tepman") in view of Takada et al. et al. (USPN 5,525,379; hereafter "Takada").

As noted by the Examiner, Tepman fails to teach the sloped segment wound around approximately one fourth the reaction tube and the winding wound around three fourths of the reaction tube. In addition, Tepman fails to teach utilizing a controller connected to the drive mechanism to control a relative moving speed between the high frequency coil antenna and the reaction tube wherein a uniformly distributed capacitive coupling between the high frequency coil antenna and the reaction tube reduces a depositing rate of etching products to extend a cleaning interval for cleaning inner walls of the reaction tube, as is recited in amended claim 2, from which claims 21 and 22 depend.

Takada does not teach utilizing a controller connected to the drive mechanism to control a relative moving speed between the high frequency coil antenna and the reaction tube wherein a uniformly distributed capacitive coupling between the high frequency coil antenna and the reaction tube reduces a depositing rate of etching products to extend a cleaning interval for cleaning inner walls of the reaction tube, as is recited in amended claim 2, from which claims 21 and 22 depend. It is respectfully submitted that Takada teaches a method for manufacturing an optical recording medium by using a helicon wave plasma CVD method to form an inorganic dielectric film on a substrate (see lines 7-12 of col. 3 of Takada).

However, it is respectfully submitted that there is no teaching or suggesting of combining Takada with Tepman. As noted above, it is respectfully submitted that the courts have held that the Examiner may not suggest modifying references using the present invention as a template absent a suggestion of the desirability of the modification in the prior art. *In re Fitch*, 23 U.S.P.Q.2d 1780, Fed Cir. 1992. Something in the prior art as a whole must suggest the desirability, and thus, the obviousness, of making the combination. *Alco Standard Corp. v. Tennessee Valley Authority*, 808 F. 2d 1490, 1 U.S.P.Q. 2d 1337 (Fed. Cir. 1986). When a rejection depends on a combination of prior art references, there must be some teaching, suggestion or motivation to combine the references. *In re Geiger*, 815 F.2d 686, 688 2 U.S.P.Q.2d 1276, 1278 (Fed. Cir. 1987).

Independent claim 2 has been amended and is submitted to be allowable under 35 U.S.C. §103(a) over Tepman et al. (USPN 5,879,575) in view of Takada et al. et al. (USPN 5,525,379). Since claims 21 and 22 depend therefrom, claims 21 and 22 are submitted to be allowable for at least the reasons that amended claim 2 is allowable under allowable under 35

U.S.C. §103(a) over the cited references.

C. Claims 24 and 26 are rejected under 35 U.S.C. §103(a) as being unpatentable over Raaijmakers et al. (USPN 6,564,810; hereafter "Raaijmakers") in view of Tepman et al. (USPN 5,879,575; hereafter "Tepman").

Amended claim 24 requires that the antenna be a *single* coil element consisting of a first winding, a second winding, and a capacitive coupling segment.

Tepman shows a coil unit including coils 152, 154 and a coil support 270. Accordingly, Tepman does not disclose or suggest a *single* coil element, as is recited in amended claim 24.

Raaijmakers (USPN 6,564,810) discloses a coil 20 located around a chamber. As shown in FIGs. 1A, 2A, 3A and 4A, the coil 20 contacts with the peripheral surface of the chamber. Therefore, the coil 20 does not include a capacitive coupling segment continuously formed between first and second windings to produce a relatively large capacitive coupling with a reaction tube, as is recited in amended claim 24.

Independent claim 26 has been amended to include a controller that controls a relative moving speed between the coil antenna and the reaction tube to provide a uniformly distributed capacitive coupling between the coil antenna and the reaction tube and thus reduces a depositing rate of etching products to extend a cleaning interval for cleaning inner walls of the reaction tube. Tepman fails to teach or suggest such a controller.

Raaijmakers teaches a method of removing deposits from selected areas of a substrate-processing chamber. However, Raaijmakers fails to teach utilizing a controller connected to the drive mechanism to control a relative moving speed between the high frequency coil antenna and the reaction tube wherein a uniformly distributed capacitive coupling between the high frequency coil antenna and the reaction tube reduces a depositing rate of etching products to extend a cleaning interval for cleaning inner walls of the reaction tube, as is recited in amended claim 26.

Thus, even if combined, Raaijmakers and Tepman do not teach or suggest the present invention.

Thus, it is respectfully submitted that claims 24 and 26 are allowable under 35 U.S.C. §103(a) over Raaijmakers et al. (USPN 6,564,810) in view of Tepman et al. (USPN 5,879,575).

D. Claim 25 is rejected under 35 U.S.C. §103(a) as being unpatentable over Raaijmakers et al. (USPN 6,564,810; hereafter "Raaijmakers") in view of Tepman et al. (USPN 5,879,575; hereafter "Tepman") as applied to claim 24 and 26 above, and further in view of Takada et al.

(USPN 5,525,379; hereafter "Takada").

Independent claim 24 has been amended to recite an inductively coupled plasma etching apparatus comprising: a cylindrical reaction tube made of a dielectric material; a single antenna located around the reaction tube to generate and maintain an inductively coupled plasma inside the reaction tube, the antenna including: a first winding connected to a power supply; a second winding connected at a ground; and a capacitive coupling segment continuously formed between the first winding and the second winding to produce a relatively large capacitive coupling with the reaction tube, wherein the first winding, the capacitive coupling segment and the second winding form a single coil; and a drive mechanism to move at least one of the antenna and the reaction tube relative to the other to perform plasma etching.

It has been described above that such an inductively coupled plasma etching apparatus is not taught or suggested by Raaijmakers, Tepman or Takada. Since claim 25 depends from amended claim 24, claim 25 is submitted to be allowable under 35 U.S.C. §103(a) over Raaijmakers et al. (USPN 6,564,810) in view of Tepman et al. (USPN 5,879,575) and Takada et al. (USPN 5,525,379) for at least the reasons that amended independent claim 24 is submitted to be allowable over same.

CONCLUSION

In accordance with the foregoing, claims 2, 11, 13, 24, and 26 have been amended. Claims 10 and 23 have been cancelled without prejudice or disclaimer. Claims 1, 4-6, 8, 9, 12, 15, 16, 19 and 20 are withdrawn, and claims 2, 3, 7, 11, 13, 14, 17, 18, 21-22 and 24-26 are under consideration.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,
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Date: March 16, 2004

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